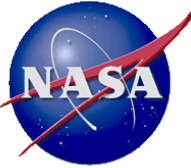


News from the US: What NASA is doing

Robin Stebbins, GSFC
eLISA Consortium Meeting
Paris, FR, 12 October 2015



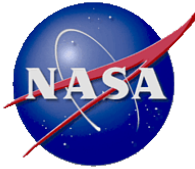
Topics

- Participating in GOAT
- Preparations for LPF and ST7
- Negotiating a role with ESA
- Midterm Assessment
- Technology development
- Pre-decadal Study
- Astro2020

US Participation in GOAT

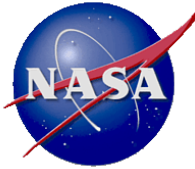
- Membership
 - Guido Mueller
 - Bill Klipstein
 - Mark Kasevich
- NASA Observer: RTS
- Vigorous participation in
 - Technology recommendations
 - Payload EM
 - Schedule
 - Atom interferometry





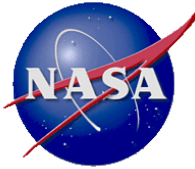
Preparations for LPF and ST7

- US participants in LPF/LTP
 - Ira Thorpe (GSFC)
 - Jake Slutsky (GSFC)
 - Tyson Littenberg (USRA/UAH/GSFC)
- Participants in ST7
 - John Ziemer (JPL)
 - Curt Cutler (JPL)
 - Peiman Maghami (GSFC)
 - Others from ST7 Project Team
- Participating in simulations and science team meetings
- Planning for extended mission



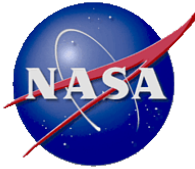
Negotiating a role with ESA

- Routine discussions between Paul Hertz, Director of NASA Astrophysics, and Fabio Favata (Prog. Coordination Office)
 - L3 a possible topic at regular monthly telecons
 - Full bilaterals ~twice/year (e.g., week of Sep. 21st)
- ESA has requested a letter stating NASA's proposed contributions in time for the meeting with member states November 5th.
- Considerations
 - Short-term technology development funding
 - Total level of participation
 - Other factors (e.g., 'enhancing science')
- New suggestion: contribute to Member States (cf., L2)



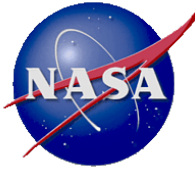
Midterm Assessment: The Basics

- What is this?
 - NASA sets strategic direction based on “decadal reviews” by the National Academy of Sciences/National Research Council (NAS/NRC).
 - Astro2010 produced *New Worlds, New Horizons* (NWNH)
 - NRC reviews “progress” in the middle of each decade. The “Midterm Assessment” is that progress review.
- Schedule
 - First Meeting: 8-10 October 2015, Washington, DC
 - Second Meeting: 12-14 December 2015, Irvine, CA
 - Third Meeting: 11-13 January 2016, Washington, DC
 - Target delivery date: 1 May 2016
- More at:
http://sites.nationalacademies.org/SSB/CurrentProjects/SSB_161177



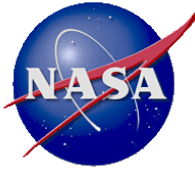
Midterm Assessment: Membership

- Membership
 - **Jaqueline N. Hewitt**, Massachusetts Institute of Technology (Chair)
 - **Adam S. Burrows**, Princeton University
 - **Neil J. Cornish**, Montana State University
 - **Andrew W. Howard**, University Hawaii-Manoa
 - **Bruce Macintosh**, Stanford University
 - **Richard F. Mushotzky**, University of Maryland
 - **Angela V. Olinto**, University of Chicago
 - **Steven M. Ritz**, University of California, Santa Cruz
 - **Alexey Vikhlinin**, Harvard-Smithsonian CfA
 - **David H. Weinberg**, Ohio State University
 - **Rainer Weiss**, Massachusetts Institute of Technology
 - **Eric M. Wilcots**, University of Wisconsin
 - **Edward L. Wright**, University of California, Los Angeles
 - **A. Thomas Young**, Lockheed Martin, retired



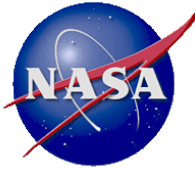
Midterm Assessment: First Meeting

- Hertz presented his response to the Astro2010 recommendations
 - JWST on budget and schedule:
 - WFIRST pre-formulation: \$2.5-2.8B (RY\$), LRD 2024-5 with start in 2016-7
 - Euclid participation: \$25M for detectors, \$170M total, late
 - Explorer AOs being issued every 2-3 years
 - Discussing L2 and L3 with ESA over LISA and IXO science
 - Current and future budgets
 - Increased budget for LPF
 - Next strategic mission could start Phase A in 2022
- NSF, DoE and OSTP presented.
- JAXA and ESA presented.
- RTS presented on “U.S. LISA Activities.”



Technology Development (1/2)

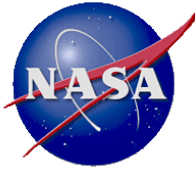
- Telescope Subsystem – Jeff Livas (GSFC)
 - Demonstrate pathlength stability, stray light and manufacturability
- Phase Measurement System – Bill Klipstein (JPL)
 - Key measurement functions demonstrated
 - Incorporate full flight functionality
- Laser Subsystem – Jordan Camp (GSFC)
 - 1064 nm ECL master oscillator
 - Phase noise of fiber power amplifier
 - Demonstrate end-to-end performance in integrated system
 - Lifetime
- Micronewton Thrusters – John Ziemer (JPL)
 - Propellant storage and distribution for long duration
 - Improve system robustness
 - Improve manufacturing yield
 - Lifetime



Technology Development (2/2)

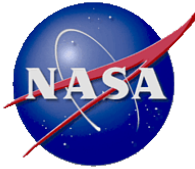
- Arm-locking Demonstration – Kirk McKenzie (JPL)
 - Studying a demonstration of laser frequency stabilization with GRACE Follow-On
- Torsion Pendulum – John Conklin (UF)
 - Develop U.S. capability with GRS and torsion pendulum test bed
- Multi-axis Heterodyne Interferometry – Ira Thorpe (GSFC)
 - Investigate test mass/optical bench interface
- UV LEDs – John Conklin+ (UF)
 - Flight qualify UV LEDs to replace mercury lamps in discharging system
- Optical Bench – Guido Mueller (UF)
 - Investigate alternate designs and fabrication processes to ease manufacturability

LISA researchers at JPL are leading the Laser Ranging Interferometer instrument on the GRACE Follow-On mission.



Pre-decadal Study

- Hertz has agreed to a pre-decadal to prepare for Astro2020.
- Timing: 2017 Q2 – 2018 Q2
- Topics
 - Science
 - Mission configurations
 - Cost and schedule
 - NASA contribution to ESA
 - NASA contribution to Member States
 - U.S. costs: technology development, participation in pre-formulation and formulation activities, collaborating with eLISA Consortium, science team, data analysis, data center, guest observer program
 - Technology
 - Scope and Duration
- Products: science case, technical readiness, technology development, cost and schedule, programmatic



Astro2020

- NASA Participation in L3 requires a strong recommendation from Astro2020
- Starting date: estimate December 2018
- Needs
 - A refreshed science case
 - Mission concept description
 - Technical readiness evaluation
 - Optional levels of participation (e.g., \$100-150M, 300M, 600M)
 - A cost basis suitable for review